K060351

MEDTOX®
DIAGNOSTICS, INC.

510(k) Summary

Purpose for Submission:	Traditional 510(k) for New Assay
Analyte:	Oxycodone

MAY 12 2006

Applicant:	MedTox Diagnostics, Inc. 1238 Anthony Road Burlington, NC 27215 Telephone: 1-800-334-1116 FAX: 1-336-229-4471 Establishment Number: 1050155
Contact Person:	Phillip Hartzog Associate Director, Research and Development Telephone: 1-336-226-6311 ext 230 Cell Phone: 336-953-6576 E-mail: phartzog@medtox.com
Date Prepared:	February 10, 2006
Device Trade Name:	MEDTOX® OXYCODONE
Regulatory Information:	862.3650 Enzyme Immunoassay, Opiates
Classification:	Class II
Product Code:	DJG
Panel:	91 (Toxicology)
Predicate Device:	DRI Oxycodone Assay, 100 ng/mL Cutoff 510(k) Number: K040411

Indications for Use

The MEDTOX® OXYCODONE Test System uses immunochromatographic test strips for the rapid, qualitative detection of oxycodone in human urine. It is intended for prescription point-of-care use including physician office laboratories and central laboratory settings. It is also intended for workplace settings, criminal justice or

forensic settings, and drug rehabilitation centers. MEDTOX® OXYCODONE is not for over-the-counter sale.

Workplace operators that may use this device are defined as individuals with a minimum of a high school education who also satisfy the following training and certification guidelines:

(1)Training should be conducted by a qualified professional and include a demonstration of the MEDTOX® OXYCODONE test system and (2) the use of quality assurance samples for monitoring and confirming the performance of the test system. Trainers should observe and confirm that the operator (3) uses proper technique when running a test sample and quality assurance samples, (4) has a basic understanding of test results, including the potential for false positive and false negative results, (5) knows how to prepare a sample for shipment to the laboratory for confirmation testing, (6) has reviewed the information contained in the MEDTOX® Training and Certification Program (available at www.medtox.com) and (7) that the operator minimally achieves a score of 80% on the written exam provided by MEDTOX®.

Operators achieving a score of 80% will be provided with a certificate of training participation. Quality assurance samples appropriate for training are available from MEDTOX® Diagnostics, Inc. Additionally, MEDTOX® Technical Support will provide access to assistance from individuals who are experienced in the interpretation of drug testing results.

The test detects oxycodone at concentrations 100 ng/mL and above.

THE MEDTOX® OXYCODONE PROVIDES ONLY A PRELIMINARY ANALYTICAL TEST RESULT. A MORE SPECIFIC ALTERNATE CHEMICAL METHOD MUST BE USED IN ORDER TO OBTAIN A CONFIRMED ANALYTICAL RESULT. GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS) IS THE PREFERRED CONFIRMATORY METHOD. CLINICAL CONSIDERATION AND PROFESSIONAL JUDGMENT SHOULD BE APPLIED TO ANY DRUG OF ABUSE TEST RESULT.

Test Principle

Each test strip contains antibody colloidal gold, a drug conjugate and a control line. A mouse monoclonal antibody specific to oxycodone is mixed with colloidal gold and applied to the sample well pad of the strip. Drug is conjugated to protein and immobilized at the test line. Strips have an anti-mouse immunoglobulin antibody immobilized at the control line. The anti-mouse antibody binds the mouse antibody coated on the colloid gold.

When urine is applied to the sample well of the device, the dried antibody-colloidal gold on the sample pad dissolves and the urine wicks up the white test strip carrying the red antibody-colloidal gold with it.

Interpretation of Results

Negative: When no drug is present in the urine sample, the red antibody-colloidal gold migrates up the test strip and binds to the drug conjugate immobilized on the membrane. The binding of the antibody-colloidal gold to the drug conjugate generates a line at the test line position on the device.

Positive: When drug is present in the sample the antibody-colloidal gold binds the drug before it migrates up the test strip. However, when the antibody-colloidal gold binds the drug in the urine, the antibody-colloidal gold can not bind to the drug conjugate immobilized on the test strip. When the drug concentration is at or above the cutoff concentration, the majority of the antibody-colloidal gold is bound to the drug in the urine. Therefore, as the drug bound antibody-colloidal gold migrates up the test strip it is unable to bind to the drug conjugate immobilized on the membrane. Therefore no line is generated at the test line position on the device.

Control Line: The test strip has an internal procedural control. A control line forms when the antibody-colloidal gold binds to the anti-mouse immunoglobulin antibody immobilized on the membrane at the control line position on the device. A line must form at the control line position on the device to indicate that there was an adequate volume of sample, the reagents migrated properly, and that the test strip is intact.

Summary of MEDTOX® OXYCODONE Performance Testing

1. Analytical performance:

   a. Precision/Reproducibility:

   Performance around the cutoff concentration was evaluated by testing drug-free urines spiked with standard solutions. Drug free urine was also tested. Testing was performed in triplicate on 6 different occasions by 3 MEDTOX employees who did not develop the test. Samples were randomized and presented as a blind panel.

   Data from this study is presented below. The test consistently gave negative results (100%) for natural urine spiked to 75% below the cutoff (25 ng/mL), and negative results the majority of the time (93%) for 50% below the cutoff (50 ng/mL). The test consistently gave positive results for natural urine spiked above the cut-off (98% 125 ng/mL and 100% for 150 ng/mL), and positive results the majority of the time (93%) at the cutoff. Most of the variability in test results occurred at 25% below the cutoff (75 ng/mL), and here the results were as variable between replicates of the sample as between operators.

Oxycodone Cutoff = 100 ng/mL			
Conc. (ng/mL)	Number Tested	Positive	Negative
0	54	0	54
25	54	0	54
50	54	4	50

75	54	40	14
100	54	50	4
125	54	53	1
150	54	54	0

POC Studies:

Precision studies were performed by 9 POC operators at 3 different sites using randomized blind samples. Each operator tested 5 replicates of the 6 levels below. The results obtained from each of the 3 sites (Site1, Site2, Site3) are listed below. Results at 75% below the cutoff and 50% above the cutoff were consistent and identical to the results with MEDTOX employees. Results at the other levels were similar to the professional study.

Oxycodone Cutoff = 100 ng/mL			
	Number Tested	**Positive**	**Negative**
Conc. (ng/mL)	Site1/ Site2/ Site3	Site1/ Site2/ Site3	Site1/ Site2/ Site3
0	15/15/15	0/0/0	15/15/15
25	15/15/15	0/0/0	15/15/15
50	15/15/15	2/0/1	13/15/14
100	15/15/15	15/12/12	0/3/3
125	15/15/15	15/13/14	0/2/1
150	15/15/15	15/15/15	0/0/0

b. Linearity/assay reportable range:

Not applicable. The assay is intended for qualitative use.

c. Traceability, Stability, Expected values (controls, calibrators, or methods):

No calibrators are required. The device is calibrated during the manufacturing process.

Controls are required but are not specified in the labeling. Users are instructed to follow federal, state and local guidelines concerning QC practices.

Traceability is not covered in the submission.

d. Detection Limit:

This information appears in the precision section above.

e. Analytical specificity:

Cross-Reactivity:

The following metabolites and compounds were initially dissolved in appropriate solvents and then added at varying concentrations to drug-free urine for evaluation. Samples were evaluated in triplicate by in-house operators. Results are expressed as the minimum concentration of metabolite

or compound required to produce a positive test result. Percent cross reactivity of a compound is calculated by dividing the cutoff concentration by the minimum concentration required to obtain a positive result and then multiplying by 100%.

Oxycodone, cutoff = 100 ng/mL	**Result** Positive at 100 ng/mL	**% Cross-Reactivity** 100%
Apomorphine	Negative at 100,000 ng/mL	< 1%
Codeine	Positive at 5,000 ng/mL	2%
Diacetylmorphine	Negative at 100,000 ng/mL	< 1%
Dihydrocodeine	Positive at 10,000 ng/mL	1%
Ethylmorphine	Positive at 5,000 ng/mL	2%
Hydrocodone	Positive at 75,000 ng/mL	< 1%
Hydromorphone	Positive at 50,000 ng/mL	< 1%
Levorphanol	Negative at 50,000 ng/mL	< 1%
Morphine	Positive at 50,000 ng/mL	< 1%
6-Monoacetylmorphine	Negative at 100,000 ng/mL	< 1%
Morphine 3-β-D-Glucuronide	Negative at 100,000 ng/mL	< 1%
Morphine 6-β-D-Glucuronide	Negative at 100,000 ng/mL	< 1%
Nalorphine	Negative at 100,000 ng/mL	< 1%
Naloxone	Positive at 50,000 ng/mL	< 1%
Naltrexone	Negative at 100,000 ng/mL	< 1%
Norcodeine	Positive at 100,000 ng/mL	< 1%
Oxymorphone	Positive at 200 ng/mL	50%
Thebaine	Negative at 100,000 ng/mL	< 1%

Non Cross-reactive Endogenous Compounds:

Listed compounds were initially dissolved in appropriate solvents and then added to drug-free urine for evaluation with the MEDTOX® OXYCODONE test. Most of the compounds were evaluated for reactivity with the test at 100 µg/mL (albumin was evaluated at 20 mg/mL and bilirubin was evaluated at 200 µg/mL). Samples were evaluated in triplicate by in-house operators. The listed compounds gave negative results with the MEDTOX® OXYCODONE test.

Acetaldehyde	Creatinine	Hemoglobin, Human
Acetone	Epinephrine	Sodium Chloride
Albumin, Human	β-Estradiol	Tetrahydrocortisone
Bilirubin	Estriol	d,1-Thyroxine
Cholesterol	Glucose Std. Solution	Uric Acid

Unrelated Compounds, Prescription and Over-the-Counter Medications:

An extensive list of compounds was evaluated by dissolving each compound in appropriate solvents and adding it to a drug-free urine for evaluation. Most compounds were evaluated for reactivity at 100,000 ng/mL. Samples were evaluated in triplicate by in-house operators and the list of compounds evaluated appears in the package insert. Compounds that demonstrated reactivity are included in the Related and Reactive Compounds section of the insert, as well as the table above.

Interference:

pH and Specific Gravity:
The test was assayed with six negative clinical samples with pH values of 4.0, 5.0, 6.0, 7.0, 8.0 and 9.0 ± 0.1. Each sample was assayed in triplicate. The pH samples were fortified with oxycodone to the concentrations of 25 ng/mL and 150 ng/mL. All the pH levels gave negative results when fortified to 25 ng/mL, and all pH levels gave positive results when fortified to 150 ng/mL.

The test was assayed with eight samples with specific gravity values of 1.003, 1.005, 1.010, 1.015, 1.020, 1.025, 1.030 and 1.035 ± 0.001. Each sample was assayed in triplicate. The specific gravity samples were fortified with oxycodone to the concentrations of 25 ng/mL and 150 ng/mL. All the specific gravity levels gave negative results when fortified to 25 ng/mL, and all specific gravity levels gave positive results when fortified to 150 ng/mL.

Common Drugs:

Following the study of M.L. Smith, et. al. (Journal of Analytical Toxicology. Volume 24:7. October 2000, pages 522-529) drug free urine samples were spiked with the targeted drugs to the concentrations of 25% and 150% of the cutoff concentrations. 100 µg/mL of the common drugs were then added to the preparation and assayed by the MEDTOX® OXYCODONE test. Samples were evaluated in triplicate by in-house operators. None of the common drugs listed in the following table affected the expected results.

COMMON DRUGS EVALUATED WITH MEDTOX® OXYCODONE TESTS

Acetylsalicylic Acid	Chlorpheniramine	Ibuprofen
Acetaminophen	Cocaine	Morphine
Brompheniramine maleate	Dextromethorphan	Phenobarbital
Caffeine	Diphenylhydantoin	d-Pseudoephedrine
Carbamazepine	Doxylamine	Salicylic Acid

f. Assay cutoff:

The assay cutoff is 100 ng/mL, the same as the predicate device.

2. Comparison studies:

a. Method comparison studies:

A method comparison study was performed at three Point of Care sites Performance was evaluated by assaying a panel of blind coded clinical urine samples containing varying concentrations of oxycodone. Results were then compared to GC/MS results. Samples were obtained from MEDTOX Laboratories, where they were screened using DRI Oxycodone 100 ng/mL cutoff Assay, the predicate device. Samples screened positive were confirmed by GC/MS. Samples screened negative were not confirmed. The GC/MS determination included oxycodone and oxymorphone, and a weighted

concentration using 100% cross-reactivity for oxycodone and a 50% cross-reactivity for oxymorphone was calculated. To obtain samples around and below the cutoff, positive samples were diluted in negative urine. These diluted samples were then assayed by GC/MS and those values used to allocate samples into the categories displayed below. Testing was performed by Point of Care personnel. Test results for MEDTOX® OXYCODONE vs. GC-MS are tabulated below.

Candidate Device Results vs. stratified GC/MS Values

Candidate Device Results	**Negative** by Immunoassay Predicate Device	**Concentration** of up to the cutoff -50%	**Near Cutoff Negative** (Between 50% below the cutoff and the cutoff concentration)	**Near Cutoff Positive** (Between the cutoff and 50% above the cutoff concentration)	**High Positive** (greater than 50% above the cutoff concentration)
Positive	0	2	2	6	37
Negative	103	5	4	1	1

% Agreement among positives is 96%
% Agreement among negatives is 97%

b. Matrix comparison:
Not applicable. The assay is intended for human urine samples only.

3. Clinical studies:

Not applicable. Clinical studies are not typically submitted for this device type and matrix.

Comparison of Predicate Device and MEDTOX® OXYCODONE

The chosen predicate device is DRI Oxycodone Assay with 100 ng/mL cutoff (510 (k) number K040411). This assay is routinely run by MEDTOX Laboratories to screen urine samples for oxycodone, allowing MEDTOX Diagnostics ready access to samples screened with the predicate device. The table below compares characteristics of the DRI Oxycodone Assay to the MEDTOX® OXYCODONE test.

Characteristic	**Predicate Device DRI Oxycodone Assay**	**MEDTOX® OXYCODONE**
Type of Assay	Competitive enzyme immunoassay	Competitive immunochromatographic test strip
Procedure	Assay run on instrument (Roche Modular System)	One step screening assay read visually
Mechanism of Detection	Antibody binding to enzyme (G6PDH) modified with drug	Antibody gold colloid complex binding to BSA modified with drug

Characteristic	Predicate Device DRI Oxycodone Assay	MEDTOX® OXYCODONE
	derivative	derivative
Test Cutoff Concentration	100 ng/mL	100 ng/mL
Ability to detect true negative samples (<LOD)	100%	100%
Ability to detect true positive samples (+50% above cut-off)	100%	98%
Crossreactivity to primary metabolite oxymorphone	103%	50%
Crossreactivity to other opiate compounds	<1%	2% or less

While the predicate device is an enzymatic test dependent on an instrument, the basic mechanism of detection of oxycodone is the same. Free drug in the urine sample competes with drug conjugated to protein for binding to a drug specific antibody. This basic mechanism and specified cutoff level supports comparison between these two devices for substantial equivalence. Additionally all positive samples were tested against the reference procedure of GC/MS.

Conclusion

Indication of use and test performance support substantial equivalence for MEDTOX® OXYCODONE to DRI Oxycodone 100ng/mL Assay. Both devices have equivalent Indications for Use. Both devices have the ability to detect true negative samples, samples with oxycodone below the limit of detection for GC/MS. Both devices have the ability to detect true positive samples, samples with levels of oxycodone 50% above the cutoff or greater. Both devices have the ability to detect oxycodone's primary metabolite oxymorphone. And both devices have limited crossreactivity with other opiate compounds. These four characteristics define the desired performance for a rapid screen assay.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Food and Drug Administration
2098 Gaither Road
Rockville MD 20850

Mr. Phillip Hartzog
Associate Director, Research and Development
MedTox Diagnostics, Inc.
1238 Anthony Road
Burlington, NC 27215

MAY 12 2006

Re: k060351
Trade/Device Name: MEDTOX® OXYCODONE test system
Regulation Number: 21 CFR§862.3650
Regulation Name: Opiate test system
Regulatory Class: Class II
Product Code: DJG
Dated: February 10, 2006
Received: February13, 2006

Dear Mr. Hartzog:

We have reviewed your Section 510(k) premarket notification of intent to market the device referenced above and have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to devices that have been reclassified in accordance with the provisions of the Federal Food, Drug, and Cosmetic Act (Act) that do not require approval of a premarket approval application (PMA). You may, therefore, market the device, subject to the general controls provisions of the Act. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration.

If your device is classified (see above) into either class II (Special Controls) or class III (PMA), it may be subject to such additional controls. Existing major regulations affecting your device can be found in Title 21, Code of Federal Regulations (CFR), Parts 800 to 895. In addition, FDA may publish further announcements concerning your device in the Federal Register.

Please be advised that FDA's issuance of a substantial equivalence determination does not mean that FDA has made a determination that your device complies with other requirements of the Act or any Federal statutes and regulations administered by other Federal agencies. You must comply with all the Act's requirements, including, but not limited to: registration and listing (21 CFR Part 807); labeling (21 CFR Parts 801 and 809); and good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820).

This letter will allow you to begin marketing your device as described in your Section 510(k) premarket notification. The FDA finding of substantial equivalence of your device to a legally marketed predicate device results in a classification for your device and thus, permits your device to proceed to the market.

If you desire specific information about the application of labeling requirements to your device, or questions on the promotion and advertising of your device, please contact the Office of In Vitro Diagnostic Device Evaluation and Safety at (240) 276-0484. Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21CFR Part 807.97). You may obtain other general information on your responsibilities under the Act from the Division of Small Manufacturers, International and Consumer Assistance at its toll-free number (800) 638-2041 or (301) 443-6597 or at its Internet address http://www.fda.gov/cdrh/industry/support/index.html.

Sincerely yours,

Alberto Gutierrez, Ph.D.
Director
Division of Chemistry and Toxicology
Office of In Vitro Diagnostic Device
Evaluation and Safety
Center for Devices and
Radiological Health

Enclosure

Indications for Use

510(k) Number (if known): K060351

Device Name: MEDTOX® OXYCODONE

Indications For Use:

The MEDTOX® OXYCODONE Test System uses immunochromatographic test strips for the rapid, qualitative detection of oxycodone in human urine. It is intended for prescription use.

The test detects oxycodone at concentrations of 100 ng/mL and above.

The MEDTOX® OXYCODONE assay provides only a preliminary analytical test result. A more specific alternate chemical method must be used in order to obtain a confirmed analytical result. Gas chromatography/mass spectrometry (GC/MS) is the preferred confirmatory method. Clinical consideration and professional judgment should be applied to any drug of abuse test result.

Prescription Use X AND/OR Over-The-Counter Use _____
(Part 21 CFR 801 Subpart D) (21 CFR 801 Subpart C)

(PLEASE DO NOT WRITE BELOW THIS LINE-CONTINUE ON ANOTHER PAGE IF NEEDED)

Concurrence of CDRH, Office of In Vitro Diagnostic Devices (OIVD)

Carol Benson

Division

ety

K060351